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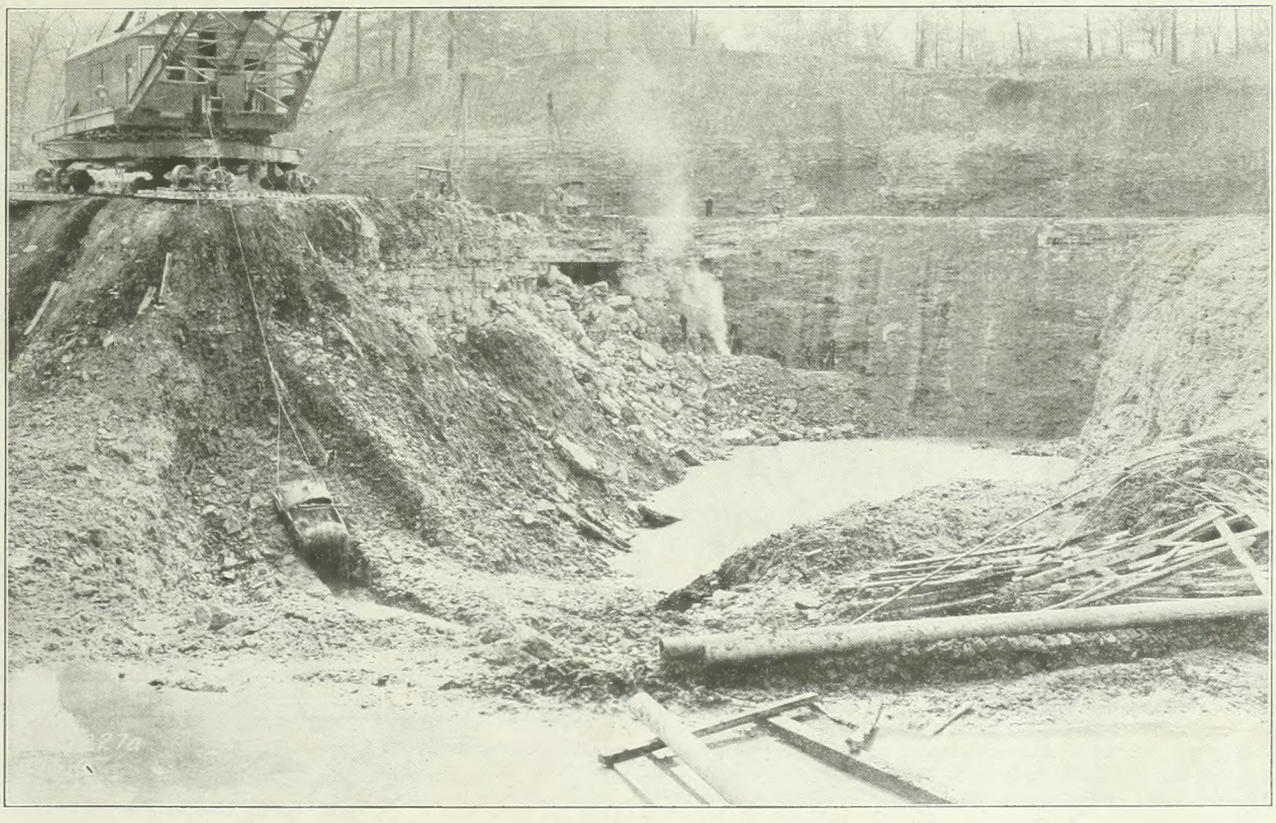
THE MIAMI CONSERVANCY BULLETIN

JUNE 1919



EXCAVATING FOR THE HYDRAULIC JUMP POOL AT TAYLORSVILLE, MAY 13, 1919.

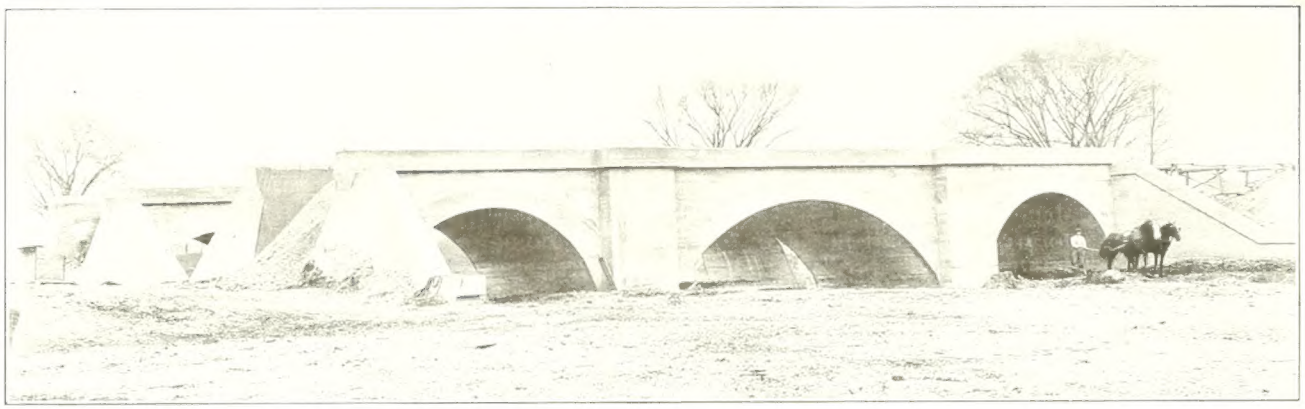


FIG. 143—BIG FOUR AND ERIE RAILROAD BRIDGE OVER MUD RUN, MAY 5, 1919.

This bridge, situated a little northeast of Osborn in the Huffman Basin, has a total length of 126 feet. It has two end arches of 25-foot, and a center arch of 40-foot span, and provides for two separate tracks 60 feet apart. In reality there are two separate bridges side by side, one for each track, the two connected by the sloping wing walls at the ends. At the left hand end the two structures appear entirely separate, the junction of the wing walls between them being below the surface of the ground. The total width of the double structure is 126 feet. The piers and abutments are supported on 25-foot piles spaced 2 feet 9 inches apart. The bridge contains 2560 cubic yards of concrete and 46,000 pounds of steel reinforcement.

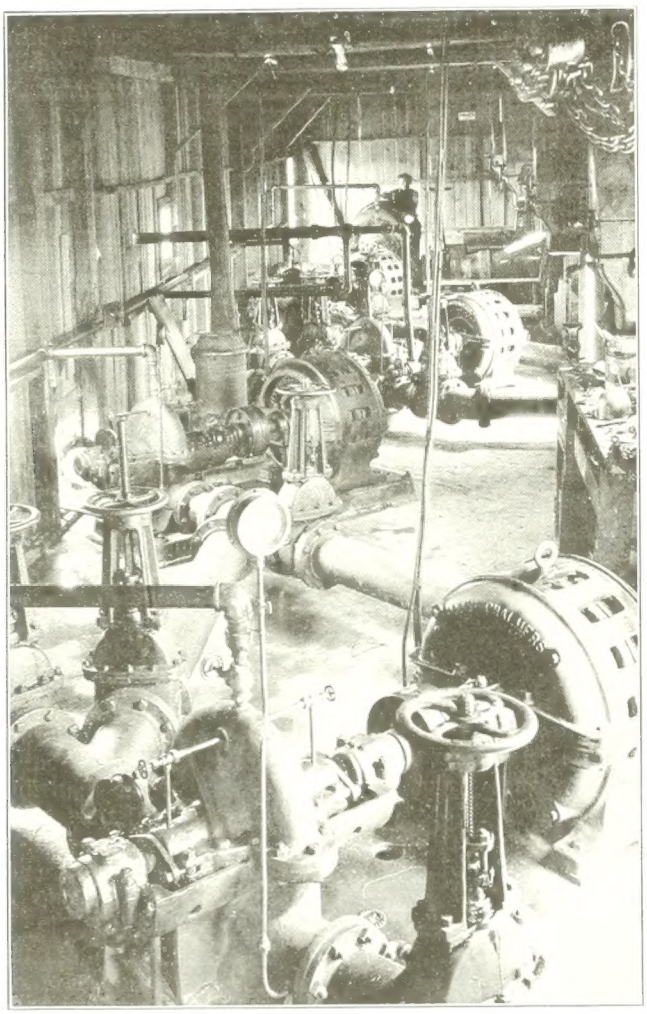


FIG. 144—PUMPS AT TAYLORSVILLE

There are four 6″ Allis-Chalmers centrifugal pumps, connected to give 2800 gallons per minute, and 300-foot head as maximum capacity. They are driven by Allis-Chalmers alternating current, 60 cycle induction motors, direct connected to the pump shafts. They supply the 2½″ Hendy "monitor" excavating for the hydraulic fill in the borrow pit. A fifth pump (the farthest) supplies the 15-inch low pressure sluicing line. Taken May 15, 1919.

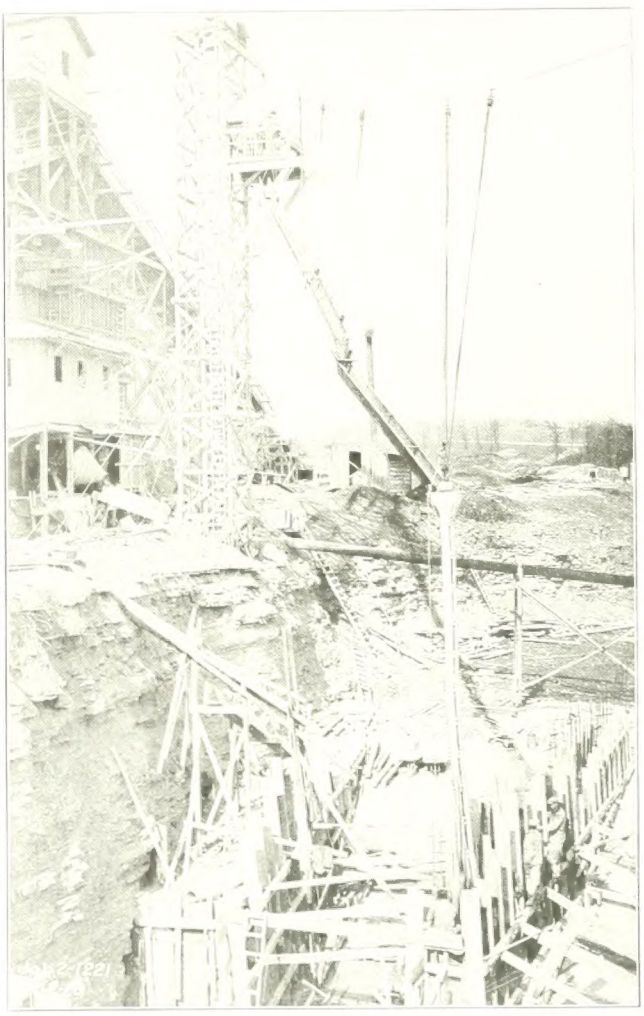


FIG. 145—CONCRETING TOWER, ENGLEWOOD

The concrete from the mixer, seen below at the left, is hoisted in a self-dumping bucket to the projecting platform just below the top, where it is discharged into the chute; and thence by gravity to the forms below. The chute is supported by a steel cable running from the top of the tower to a "dead man" in the ground (out of the picture) at the right. The work is for the concrete inlet channel to the conduits. Taken April 29, 1919.

THE

MIAMI CONSERVANCY BULLETIN

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DAYTON, OHIO

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Index

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The Completion of the Germantown Conduits

The concrete conduits at Germantown, with their connected inlet and outlet structures, were finished on May 10. They were the first of these structures to be completed at any of the dams, but will be followed closely by both Englewood and Lockington, at both of which places this work will be completed probably by the first of June.

The length of the entire concrete structure is 840 feet. Its maximum width, which is at the outlet, is 108 feet. The conduits proper are two in number, side by side, and 546 feet in length. The total number of cubic yards poured was 15,368. The work of placing the concrete was begun on October 5, 1918. It thus covered a period of 7 months and 5 days. During this period there were only 23 working days in which concrete was not mixed and placed. Four days were lost because of high water during the flood of March 14-19. Two days the power was off on the electric transmission line, due to transformer troubles. Only one day was lost on account of cold weather, an indication of the unusual mildness of the winter season, during which a large part of the work was carried on. The concrete has been placed with great care, with the result that it is of unusually high grade, especially in the barrels of the conduits. It should be noted that this work does not include the spillway structure, which is entirely separate and will be done at a later stage in the operations. A full account of the work on these conduit structures will be published in an early issue of the Bulletin.

Victory Gardens

The National War Garden Commission appeals to all Victory Gardeners—and this means us of the District—for special effort to make good the loss of fruit in the cold wave of some time ago. The State Horticultural Commission estimates that the loss in Ohio alone by that frost was two million dollars. The appeal is for vegetables to take the place of the destroyed fruit.

"Drop in a few beans, potatoes, and onions"—"plant more vegetables."

Then don't forget to use the hoe on weeds.

Remember also that it pays to use the hoe regardless of weeds, just to keep the ground moist and mellow. It's the "dust mulch" on top which keeps in the moisture that comes up (like oil climbing a lamp wick) from the ground water below.

It is a good plan also to exercise your brain on your garden as well as your hoe. Sweat your forehead on the inside as well as the outside.

Victory Loan Drive

The result of the Conservancy Victory Loan Drive was unexpectingly gratifying. In spite of the unusual attractiveness of the Victory notes as a financial investment, it had not been hoped, with the let-down in public feeling since the armistice, that the figures of the old loan could be approached. The quota set was the same in both drives, $100,000. This figure in the Fourth Loan was liberally exceeded. The Fifth Loan workers scarcely expected to reach the top. They simply set a high mark to climb toward.

The early showing, due to unavoidable causes, among which was the necessary absence of Mr. Sibley who had charge of the drive, was not such as to change the expectation of those interested. In the Fourth Drive $70,000 had been subscribed at the end of the first week. In the Victory Drive the figure at the end of the second week had only reached $52,750.

The third week, however, told a different story. Dayton, for instance, went from $11,900 to $26,700 during that week, Huffman from $5,350 to $12,500. Germantown, relatively, showed the greatest improvement of any project, running from $1,500 at the beginning of the week to $10,300 at the end. The greatest credit, however, must fairly be awarded to Englewood, not only for the last week's record, but for the entire drive. Division Engineer McCurdy, in charge, pulled off in fact a characteristic stunt. He had discovered the value of Englewood pep concentrated in a mass meeting during the Fourth Loan Drive, and he applied the scheme again with even better results than before. He held the mass meeting at one o'clock on Wednesday, May 7, and had every man on the Englewood job at the meeting. It went like an old-fashioned revival, with McCurdy in the pulpit, exhorting the sinners to come forward and save their souls. McCurdy is some exhorter, and in less than fifty minutes had jumped the Englewood subscription, which stood at $4,250, to more than $20,000. By Saturday, pay day, the interval being devoted to rolling up the snow ball still bigger, the Englewood total had reached $27,350. This figure placed Englewood not only at the head of the Conservancy projects in total amount subscribed, but also in the amount contributed per employee, the latter figure being $82.13. Lockington, however, on the per capita basis is a close second, and on the two drives together, is still well in the lead.

The following table shows the figures for the various projects:

Job	Total	Employees	Total Per Capita
Englewood	$27,350	333	$82.13
Lockington	16,750	210	79.76
Taylorsville	16,450	221	74.43
Dayton	26,700	442	60.40
Huffman	12,500	281	44.41
Germantown	10,300	261	39.46
Hamilton	5,650	191	29.58
R. R. Relocation	11,400		
Total	$127,100		

The per capita for the Railroad Relocation is not figured on account of the fact that the railroad work, where the construction is being carried out by contractors, presents conditions which would make the comparison unfair to the latter. The average per employee of the Conservancy District, excluding the railroad work, was $57.26, the total for the drive $127,100. This exceeded the mark set by $26,150, and the amount expected by a considerably larger sum. The number of persons contributing totaled over a thousand.

The thanks of the District and of the country are due to the patriotic men on all the Conservancy projects, who put their shoulders to the wheel for this fifth and last loan. Special thanks should be rendered to Mr. Sibley, who led the drive, to Mr. Hauck, the Camp Overseer, who gave much time in operating moving picture machines, and especially to Mr. T. N. Wilson, editor of the Dayton Town Talk, who helped greatly by speaking at several meetings.

The Electric Equipment at Englewood

The leading place in the present issue is devoted to a description of the electrical layout at the Englewood dam. For the matter presented the editor is very largely indebted to Mr. Frank Harvey, the Chief Electrician for the District, and to Mr. Kneer, in charge of electrical work at Englewood. Also to Mr. B. M. Jones, Division Engineer at the Lockington Dam.

Track-Laying to Begin Soon on the Railway Relocation Work

The work of grading on the various relocated railway lines has reached a stage so advanced that track-laying will begin in the near future. There are four of these railways which, on account of running across one or other of the retarding basins created by the building of the Conservancy dams, have been shifted up the valley slopes. On the Baltimore and Ohio 725,000 cubic yards of earth has already been moved, and about five miles of new sub-grade are completed on which track-laying will begin soon. The new track will be of 100 pound steel. The grading on this road has been done by H. C. Kahl, general contractor, represented on the ground by W. J. Hayes. The railway is represented by A. H. Griffith, Engineer of Construction, and P. A. Callahan, Assistant Engineer.

On the Erie and Big Four Railways and the Ohio Electric, grading for all of these being conveniently carried on together, 935,000 cubic yards of excavation have been moved, a large portion of which has been rock from the heavy cut in Huffman Hill. The Erie and Big Four will be located side by side as a double track. About four miles of this sub-grade has been finished ready for the track, which will be of 90 pound steel. Walsh Brothers have been the general contractors for the grading of this work, with W. A. Durkin as Superintendent, the two steam railways being represented by G. P. Smith, Consulting Engineer, and W. Hodge, Resident Engineer. In all about 55 miles of new track will be built, calling for about 165,000 ties. The Ohio Electric, represented on the work by Mr. O. Minnich, will be laid with 70 pound steel. The track-laying on all the roads will be done by contract. The work has been well handled as a whole on all the lines, and will be pushed forward rapidly during the coming season. Much of the grading has been done, working double shift, and the same system will be continued. The interests of the Conservancy District are being looked after by Albert Larsen, Division Engineer.

There were cut in the Marquart Woods in Huffman Basin last winter six of the largest oak logs which have been cut in Ohio in recent years. They are to be used for "spud" timbers for the scows on the Miami River. Three of these timbers are 24 inches square by 24 feet in length. The other three are 21 inches square by 24 feet in length. The largest tree cut was 4 feet in diameter at the base and probably 95 to 100 feet high.

Electrical Equipment at the Englewood Dam

The electrical equipment at Englewood has been selected for description because it is typical, including practically everything found at any of the dams. The advantages of electrical equipment as applied to such work were given in the March Bulletin and will appear more clearly in the present article.

The nature of the Englewood power problem is indicated by the map, figure 147. This dam is the largest of the five to be constructed. Its length, shown in dotted outline, is 4660 feet; its thickness at the base, 740 feet. 3,500,000 cubic yards of earth must be excavated, transported, and placed to form the main structure. The "borrow pit" supplying this earth extends up the Stillwater valley (northward) about three-fourths of a mile. The valley floor averages about a half mile wide. To all of this area, power and light must be delivered. Power and light must also be made available at the camp southwest of the western end of the damsite and for the camp water supply north of the damsite.

This power must be delivered to many different machines of highly varying sizes and for many purposes. There are two powerful electric dragline excavators, taking 280 H. P. each, one working in the borrow pit, another on the damsite just east of the river. There are two centrifugal dredge pumps, taking 500 H. P. each for pumping the mixed mud and water from the hog box to the hydraulic fill pool. Later, when the dam has risen to a height of about forty feet, two similar machines, of 500 H. P. each must be used as "booster pumps" to help the first two. Two 100 H.P. centrifugal pumps wash the earth from the "hog box" into the "sump." There must be other smaller motors for running the shops, the air compressor, the derricks, unwatering pumps, the gravel washer, etc. In all, some 29 power outlets, totaling 3200 H. P., can be counted.

It is a peculiarity of such construction work also that a number of these power outlets do not "stay put." The draglines, unwatering pumps, etc., must be moved from point to point as the work progresses.

The source of power is the 33,000 volt high tension line of the Dayton Power & Light Company, tapped from the company's main line at Johnson Station, 7½ miles from the Englewood dam. For use, this high pressure is "stepped down" at the Englewood sub-station to 2300 volts. The six

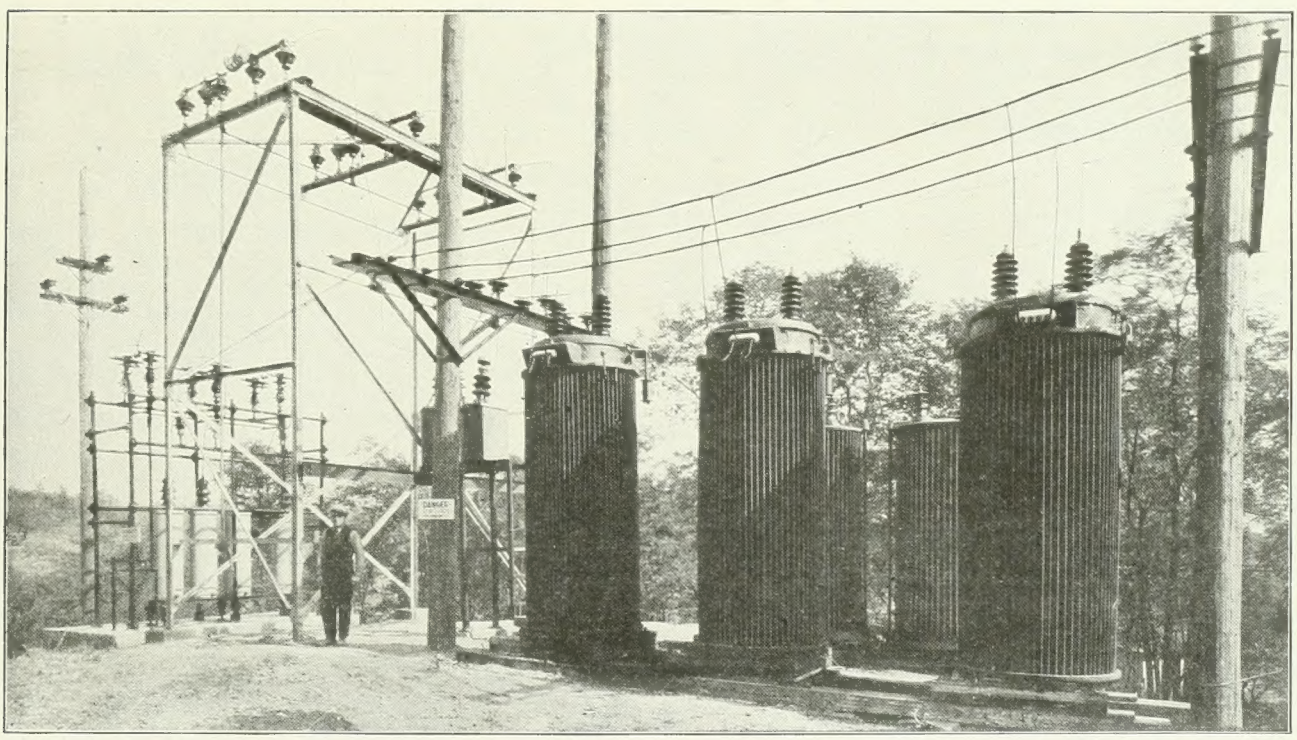

FIG. 146—THE ELECTRIC SUBSTATION AT ENGLEWOOD DAM, OCT. 4, 1918.

This is a transformer station taking its power from the 33,000 volt high tension line of the Dayton Power and Light Company. This is a highly dangerous voltage and to make it safer the current is "stepped down" to 2300 volts in the "transformers," which are contained in the five large tank-like structures seen at the right. (There are now six of these.) The transformed current passes to the work over the heavy wires seen directly over them. For use in the motors it is stepped down in a second set of transformers to 440 volts; for the house lighting to 220 volts. The box-like looking piece bolted to the pole just at the left of the transformers contains the electric meters for measuring the power used on the work. (About 3200 horse-power.) The apparatus mounted on the iron frame work to the left is the lightning arrester, an effective but complicated piece of apparatus described elsewhere. (See page 174.) The apparatus at the top of the high iron frame work consists of three "choke coils" and three "air break" switches to cut off the transformers from the high tension line. The "choke coils" are for the purpose of "choking" the lightning discharges which might come in off the main line, and sending them harmlessly through the cylinders at the left (a part of the lightning arrester) to the ground. (See Fig. 154 and description.)

"transformers" affecting this deliver a maximum of 3217 H. P. The sub-station is located on the hill slope just north of the damsite (see figure 147), far enough up the hill to be safe from flood during construction, while at the same time conveniently near the work.

From this sub-station a pole line, as shown on the map, extends westerly across the Stillwater River and south along the conduits. From this main line, "feeder" pole lines are tapped off to supply the camp and camp water supply; also the dragline excavators, the dredge pumps, and the other motors previously enumerated. The details are given on the map and in the description under it.

From the feeder running north up the center of the borrow pit, cross feeders are run at intervals of 1,000 feet. From these feeders electicity is bought to the draglines by heavily insulated flexible copper cables laid along the ground. These cables are 500 feet long, thus enabling the excavator to work to that distance each side from any of the cross feeders. The cross feeders being 1,000 feet apart, the excavators are thus able to do the work anywhere within the limits of the borrow pit.

These various pole lines at the dam all carry the electric current at a pressure of 2300 volts, except the lines to the camp and camp water supply pump. These carry it at 440 volts. For use in the motors the 2300 volts, which is a dangerous pressure, is transformed to the safe pressure of 440 volts. For house lighting at the camp the pressure is further reduced to 110 volts, the usual figure. The four powerful dredge pumps are an exception, taking current at 2300 volts.

Special precautions are taken to indicate not only danger, but the various degrees of danger and of safety. On the 33000 volt pole line the wire is carried on large brown porcelain insulators; 2300 volt current is carried by small brown porcelain insulators; 440 volt current by large, green glass insulators, and 110 volt current by "pony" green glass.

For inside work the 2300 volt wires are carried on porcelain cleats painted red; 440 volt wires on white cleats and 110 volt wires on round knobs. Thus the workmen can tell at a glance exactly what voltage any line is carrying. In addition "Danger" signs in red letters are hung or tacked upon all apparatus, such as transformers, motors, etc., where accident might occur.

Great Saving in Coal

To those unfamiliar with the subject, a comparison of the coal consumed in delivering power at Englewood from a big central station by electric transmission as against direct delivery by steam boiler and engine on the ground at the dam, may be interesting. It will also explain one reason why electric power was chosen.

A first-class modern steam turbine power plant like that of the Dayton Power & Light Company at Millers Ford, Dayton, has an efficiency of about 14.5 per cent; that is, the steam turbine delivers to the electric generator about 14.5 per cent of the energy

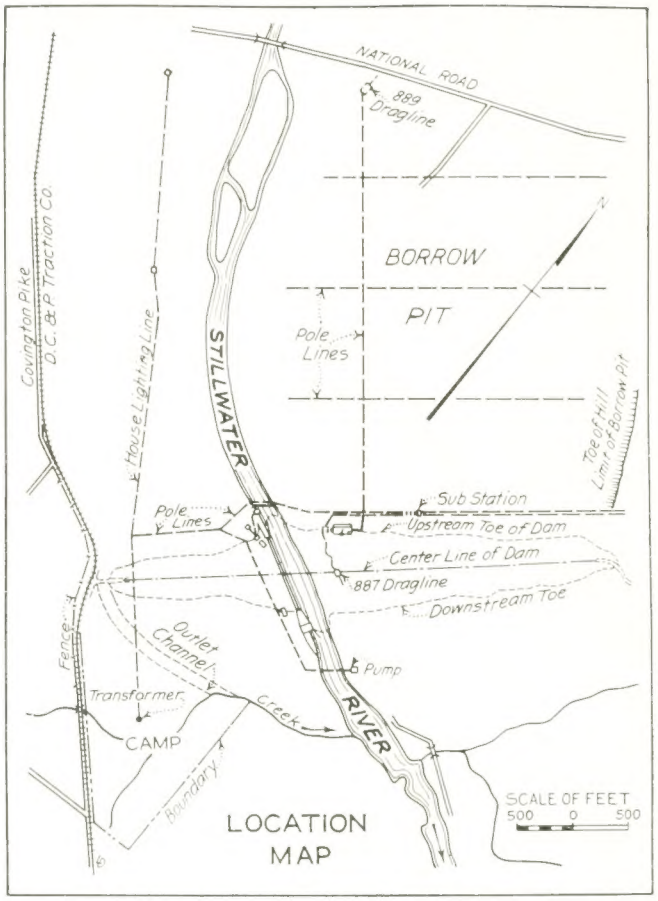

FIG. 147—LOCATION MAP, ENGLEWOOD

contained in the coal burned under the boilers.* The electrical generator converts the energy it receives to electrical energy and delivers it to a "transformer" which "steps" it up from 6600 to 33,000 volts and shoots it miles over the transmission wires to Englewood. The Englewood substation transformer takes it, "steps it down" again to 2300 volts and feeds it through the local wires to still a third set of transformers. These again step it down to 440 volts and deliver it to the electric motor. The motor again transforms it into mechanical energy, which it delivers to a pump or other machine to be used on the work at the dam.

The energy from the coal pile in Dayton to the pump at Englewood is thus passed, from hand to hand as it were, like the buckets at an old-fashioned fire, seven times (including the two steps—fire to steam and steam to engine shaft); but just as every time the fire bucket is carried, or passed from hand to hand, some water spills over and is lost, so with the energy in the Dayton coal. Some of it is lost at each change, till by the time it reaches the Englewood pump, only 11.8 of it remains. (Efficiencies of transmission at the various stages are as follows —coal pile to electric generator, 14.5 per cent; electric generator, 96 per cent; transmission lines and transformers, 92 per cent; electric motor, 92 per

*Note.—14.5 per cent seems a low figure, but a steam engineer will tell you that it is a very high one for steam apparatus. The heat in the steam at the Millers Ford plant is so thoroughly used up, in the passages of the steam turbine, that it comes out actually cold—(75° F.). This thorough extraction is accomplished by making the steam exhaust into a very high vacuum (28" of mercury). In spite of this fact, 14.5 per cent only of the heat energy in the coal can be delivered by the turbine in mechanical form. Low efficiencies are in the very nature of steam equipment.

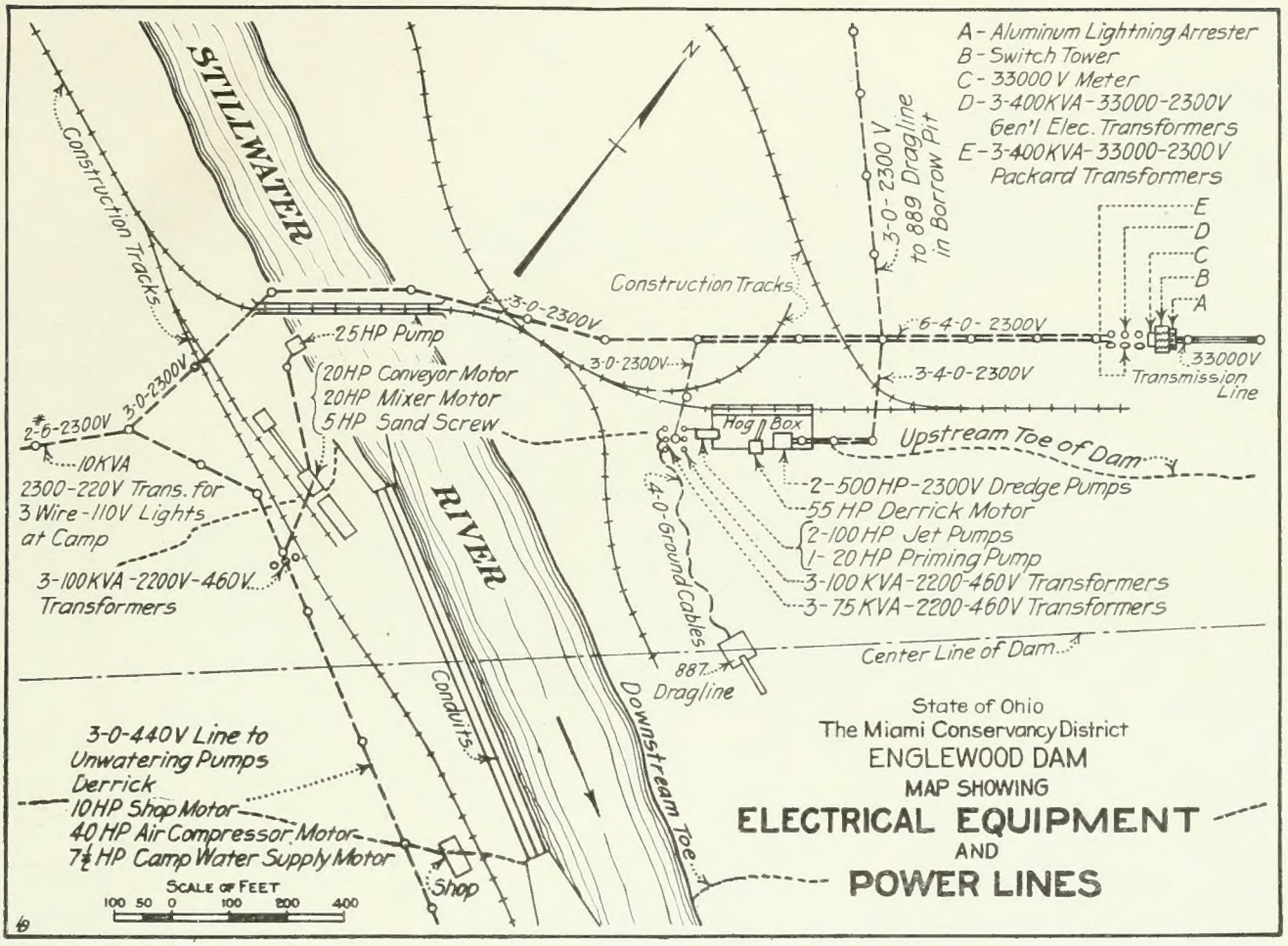

FIG. 148—ELECTRICAL EQUIPMENT AND POWER LINES, ENGLEWOOD DAM

The 33,000 volt, 3 phase high tension current of the Dayton Power and Light Company comes in from the right to the substation ABCD. It is carried from this at 2300 volts over the pole lines as indicated in the drawing, excepting in the lines to the camp and houses, and to the camp water supply pump. These are 440 volt lines. Most of the details are indicated clearly on the map. The total power consumed will be over 3000 H. P. when the two booster pumps for the hydraulic fill (which are not shown) have been placed in operation. The greater part of this power will be consumed in the hydraulic fill operations. Two thousand H. P. of this will be taken by the two 500 H. P. dredge pumps at the hog box, and the two booster pumps of the same size. These are direct connected to Allis-Chalmers variable speed 2300 volt A. C. motors. The 10-inch jet pumps are direct connected to 100 H. P. Allis-Chalmers motors. All these pumps are primed by a 4-inch American centrifugal pump direct connected to a 20 H. P. Wagner motor. The dredge pumps are 15-inch pumps. Each of the electrical draglines has a 200 H. P. Westinghouse slip-ring, variable speed motor connected to the hoist cable, and a 75 H. P. similar motor connected to the swing gearing; also a 3 H. P. air compressor motor for working the air brakes and friction clutches. The dragline seen on the damsite, east of the river, will later be placed in the borrow pit with the other. These dragline motors take their power at 440 volts from transformers which can be transported and placed at any point needed next the pole line. The connection of dragline to transformer is through three 500-foot cables of No. 0000 B. & S. gage, stranded, flexible wire, with 3/64" rubber insulation heavily varnished and covered with two braids of seine twine saturated with insulating compound. These cables are laid on the ground and can be carried through the borrow pit pools of water without injury. They permit the draglines to operate, with the pole lines spaced as shown, anywhere in the borrow pit. The draglines load the excavated material, much of which is below water level, into dump cars which are transported by 40-ton steam locomotives to the hog box over the construction tracks as indicated.

Minor outlets for power are the shop with its 10 H. P. motor and 40 H. P. air compressor motor, the camp water supply pump motor (7½ H. P.); and the camp lighting system. There are also motors to pump water to wash the gravel (25 H. P.), to run the gravel belt conveyor and sand screw, and to run the concrete mixer.

The substation is protected from lightning coming in over the main line by a standard General Electric alternating current, aluminum lightning arrester described elsewhere, and on the other side by a standard General Electric multipath transformer lightning arrester. The power is metered by a standard Westinghouse 33,000 volt integrating watt-hour meter, combined with a graphic maximum demand meter which registers the demand during each half hour of service throughout the twenty-four. Charge is made on the basis both of current used and of the maximum demand for current during the month.

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cent. The successive multiplication of these factors will give the 11.8 per cent delivered to the Englewood pump.)

With a boiler and engine on the ground at Englewood directly connected to the pump, the last five steps in the above process of transmission are cut out, leaving only two, towit: fire to steam and steam to engine shaft. Yet so great is the heat loss in even the best construction boilers and engines in practical use on such work as that at the Englewood dam, that only 4 to 5 per cent of the energy in the

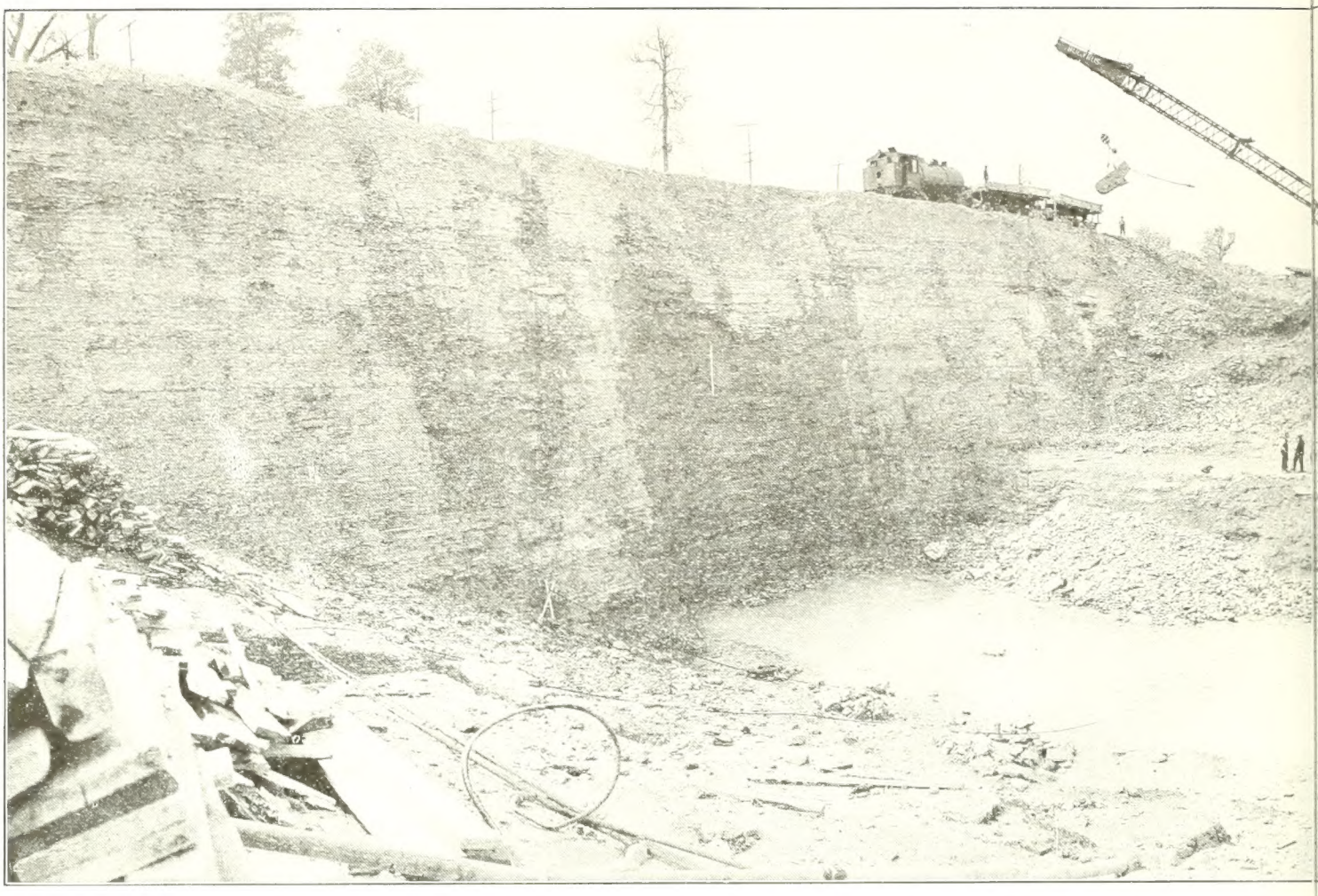


FIG. 149—EXCAVATION FOR OUTLET WORKS BELOW CONDUITS AT THE HUFFMAN DAM, MAY 15,

coal is delivered to the pump. The remaining 95 to 96 per cent is unavoidably thrown away.

Thus by steam-turbo-electric-transmission from Dayton to Englewood our pump gets 11.8 per cent of the energy in the coal; by boiler and engine plant right on the job it gets as an average 4½ per cent; a ratio in favor of the steam-turbo-electric-transmission of 262 per cent. Or, putting it another way—the steam-turbo-electric system will deliver at Englewood as much energy from one pound of coal as the boiler and engine on the ground will deliver from 2.6 pounds.

It must be noted that the above figures cover coal consumption alone. They do not cover other factors like first cost of equipment, etc., which greatly reduce the relative advantage of the steam-turbo-electric-transmission system.

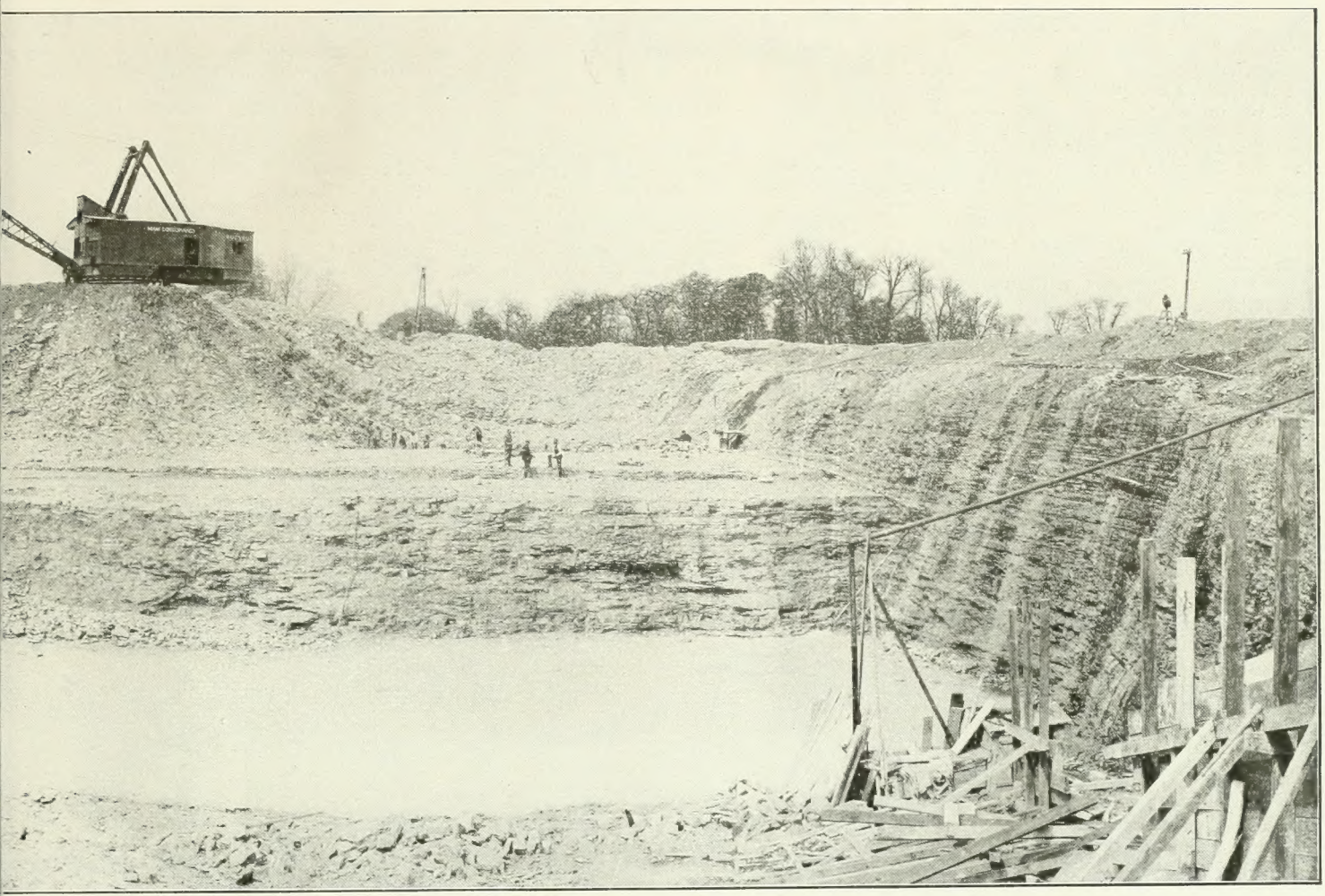
Looking at the power problem of a country in its larger aspects, this coal saving is extremely important. The figures given above will indicate why in England today 16 great steam-turbo-electric central stations are planned to be built at the mouths of English coal mines, in all the great manufacturing centers, from which electric power will be carried eventually to every city and village in Great Britain, at an enormous saving both in coal and in waste by coal transportation.

Superintendent F. H. Sprague Resigns

F. H. Sprague, Superintendent of Conservancy work on the Ohio Electric Railway, resigned his post, to take effect May 15, following a period of ill health. Mr. Sprague came with the Conservancy in April, 1918, and was superintendent of masonry on the Big Four Railway Relocation until that work was completed, when he was transferred to the Ohio Electric Railway construction. Mr. Sprague did excellent work and his departure is to be regretted. He expects to engage in his old work as a contractor with headquarters at Utica, N. Y. His place on the Ohio Electric will be taken by Leslie Wiley, who has been his efficient assistant on that work.

FIG. 150—CROSS-SECTION OF 33,000 VOLT ELECTRIC LINE TO ENGLEWOOD

The three round spots (a trifle over a quarter of an inch in diameter) show the exact size of the three wires which bring the high tension electric current to Englewood from the Dayton Power and Light Company's central station. The electrical pressure is stepped down from 33,000 to 2300 volts in the substation at Englewood (shown in Fig. 146). Thirty-two hundred horse-power of electrical energy will come into the Englewood substation, at maximum output, through the three ¼-inch wires shown above.



9. MAXIMUM WIDTH OF EXCAVATION 220 FEET. MAXIMUM DEPTH 65 FEET. SEE ALSO FIG. 155.

May Progress on the Work

GERMANTOWN

On May 10 the last of the concrete was placed in the structure, excepting the permanent floor in the conduits, which will be placed in the future, after the earth work of the dam is completed. The total amount placed was 15,368 cubic yards. This marks a definite turning point in construction progress, as most of the work in the future will be confined to the hydraulic fill of the dam.

Considerable progress has been made on the hydraulic pumping plant during the past month. The dredge and monitor pumphouses have been erected and the equipment installed. Also the concreting of the dredge pump sump and "hog box" floor have been completed.

The cross-dam along the north bank of Twin Creek is in process of construction preparatory to placing the hydraulic fill. The earth is placed in the cross-dam by the large dragline. Men work on top of the embankment thus formed, armed with long pipes or nozzles connected to a water pipe and hose. With these nozzles they bore vertically down into the embankment, forcing the water, which is delivered under a high head, into the ground, thus forming a semi-hydraulic fill. At present this cross-dam is about two-thirds completed.

A semi-hydraulic fill is also being placed along the conduits. The earth is shoveled in by hand and water then pumped over the earth to insure a final settling and good bond between the earth and the concrete.

Arthur L. Pauls, Division Engineer.

May 15, 1919.

LOCKINGTON

To date, 27,700 cubic yards of concrete have been placed in the outlet structure, and it is expected that the concreting will be finished during the month except for the spillway weir and the bridge spanning the structure. These will be built when the dam has been practically completed.

The outlet channel is practically finished, both slopes having been graded and trimmed. The upper 200 feet is riprapped on both sides, while the lower part is surfaced with rock waste on the east bank and grassed on the west. A considerable amount of the excavated material has been worked into the dam, along the lower slope between the outlet structure and the creek.

The cut-off trench has been excavated from the outlet works to the creek and the material, being suitable, was used in the toes of the dam. The Class K dragline which has been doing this excavation is moving to commence the entrance channel. It is working both day and night shifts.

The installation of equipment for sluicing and pumping the hydraulic fill into the dam is proceeding satisfactorily. The monitor pump house is finished and the 15-inch monitor supply pipe has been laid. The foundations in the sump are ready to receive the dredge pumps. The floor and walls of the building have been concreted. Deepening of the supply channel in the bed of the Miami and Erie Canal north of Lockington is under way and will be completed about May 24. The 12-inch dredge pipe is on the ground and preparations are being made for laying it at once.

A stretch of the east end of Road 8 is practically completed. The 2300-volt power line has been extended to the west end of the dam for operating the Class K dragline when it is at work placing fill in the dam across the creek.

Barton M. Jones, Division Engineer.

May 17, 1919.

HUFFMAN

A total of 8600 cubic yards of concrete has been placed in the structures that will form the outlet for Mad River when the dam is completed. 4200 cubic yards were placed during the month of April. The floor in this structure is completed down to the lower end of the piers that form the conduits. The two side walls are completed from the upper end down to the point where they slope up to the top berm. Other sections below this have been started and poured to various elevations.

The excavation for the outlet works has been continued during the past month. The part of this work required to prepare the foundation for the concrete work is approaching completion. The part of the material taken out in the above excavation, needed in the fill for the relocation of the railroad, has all been placed, and at the present time the material is being placed below the dam, along the bank of Mad River.

Work has begun on the construction of the sumps and storage bins, from which the material for the main embankment of the dam will be pumped.

C. C. Chambers, Division Engineer.

May 17, 1919.

HAMILTON

The Buckeye Street sewer work has been completed. The street repaving over the trench will be done as soon as the backfilling has settled thoroughly.

The excavation for the Wood Street sewer has been completed for a distance of 300 feet from the outlet, and concrete has been placed in the apron and in part of the sewer.

The Class 14 Bucyrus dragline has completed the levees for the hydraulic canal across the north spoil bank, and a railroad embankment from the Pennsylvania railroad to the Ford tractor plant. This embankment will be used by the District for a dumping track to start the filling of the spoil bank. This dragline will now proceed with the excavation for the tail-race for the new hydro-electric plant of the Hamilton & Rossville Hydraulic Co.

The completed levees have been seeded to grass during the past month and top soil is being placed on the levee and berm south of the Columbia bridge.

Clearing on the north spoil bank has been completed.

The total amount of material moved to date by the two draglines, not including second handling, is 510,000 cubic yards.

C. H. Eiffert, Division Engineer.

May 14, 1919.

TAYLORSVILLE

The hydraulic sluicing during the last month made fair progress in spite of the fact that the working face in the excavation is crossing some comparatively low ground, where the depth of the earth on top of the rock runs from about twelve to twenty-five feet.

We are also using up the cast iron dredge pump runners that were on hand. This caused rather frequent changes of the runners. The average dirt removed per hour for the month of April was 119 cubic yards, measured in the excavation, or 140 cubic yards measured in the dam.

The Lidgerwood Dragline is making fair progress on the rock excavation in the outlet works. The face of the excavation is now about fifty feet high, and the Cincinnatian a few feet back from the exposed surfaces, is found in rather thick, heavy, horizontal layers. A number of these run from three to five feet thick. These, of course, break up into very heavy blocks when shot, many having to be drilled and shot again before they will go into the dragline bucket. This makes the work of the dragline slower than it would be otherwise.

Most of the form work for the concrete arch bridge on the center line of the dam, over the re-location of the B. & O. R. R., has been finished, and the steel re-inforcement has been placed in the footings ready for the concrete.

Two more double houses and a number five cottage are under construction. The number four that was recently burned is also being reconstructed.

A location has been worked out for the proposed road from the east end of the dam, running north to join the National pike at the top of the bluff east of Tadmor.

O. N. Floyd, Division Engineer.

May 19, 1919.

ENGLEWOOD

The last arch section in the outlet conduit was completed April 30. Substantial progress on the retaining walls at the inlet has been made.

Work on the cross dam east of the river is steadily progressing, the embankment having reached a height above its base of about 25 feet. Material for this work comes from the main borrow pit, north of the dam, and is spread by means of a large electric dragline excavator.

One steam and one electric dragline are excavating material in the borrow pit to be used for the construction of the dam. Four trains of 12-yard air dump cars transport this material to the hog box where it is mixed with the requisite amount of water and pumped into the dam by means of 15-inch centrifugal dredge pumps. The progress on this work has been so satisfactory to date that it can confidently be predicted that the date of completion will be well within the schedule time. Furthermore, the character of the material in the borrow pits is fulfilling all expectations as to its quality for the construction of a hydraulic fill dam. Both pumps are operating 20 hours per day and averaging well over 4,000 cubic yards of embankment built per day.

Work on the new highways is proceeding as favorably as the rainy weather will permit.

H. S. R. McCurdy, Division Engineer.

May 15, 1919.

RAILWAY RELOCATION

B. & O. Relocation. The general contractors, Grant Smith and H. C. Kahl; subcontractors, Condon & Smith, Vang Construction Co., and Kahl Bros. Construction Co. excavated during the last month 85,000 yards, making the total excavation about 77% complete.

The steam shovel work from Tadmor to Miami River bridge is all done now with the exception of about 10,000 yards in cut at Stop 8 road.

The Vang Construction Co. have completed the big cut north of Johnson Station.

This completes all of their steam shovel work except the east railroad levee.

Condon & Smith have started a team outfit at the extreme north end of the work.

Their shovel is making good progress in the cut north of Tadmor. Preparations are being made to begin track laying. Material will soon be delivered for this work.

Ohio Electric Railway Relocation. All footings and columns have been completed for the reinforced concrete trestle over Mud Run northeast of Osborn. This work has been done under the direction of F. H. Sprague. He has also made a fine start on the 18-foot fill north of the Mud Run trestle, using a stiff leg derrick with 1-yard dragline bucket on each side of the fill. Clearing has been completed for the right of way over Smith Ditch and Mad River northeast of Osborn. Contractor J. C. McCann completed one mile of grade by using slip and wheel scrapers, and is arranging to put a small steam shovel in the heavier cuts.

Big Four and Erie Relocation. The Walsh Construction Company, encountering very hard material to excavate in the big cut at Huffman Dam, removed 37,300 cubic yards of rock during the month of April. George W. Condon has two elevating grader outfits at work cleaning up the light grading work on the line and also has his steam shovel working northeast of Fairfield. This shovel has taken one cut through the hill down to grade, moving, together with the grader outfits, a total of 44,700 cubic yards during April. Mr. Condon is now grading the highway change through Huffman Dam camp.

All the steel rails required for the entire Erie track have been unloaded in the Erie East Dayton yards.

Albert Larsen, Division Engineer.

May 19, 1919.

DAYTON

Total channel excavation to date is 395,000 cubic yards. A total of 275,000 cubic yards has been placed in levees and spoil banks. In accomplishing this work 615,000 cubic yards has been handled.

Dragline D-16, one of the large machines, has been placed on the 40 ft. x 80 ft. scow and has completed the channel excavation along the south side of Mad River below Webster Street. The material, after being placed on the north side of Mad River channel, was moved into the spoil bank by the other large dragline.

The small caterpillar dragline, D-19, has excavated a channel under Main Street bridge to afford sufficient depth for the passage of D-16 under the bridge at a later date. This machine is now building an earth cofferdam for use in constructing an extension to the storm sewer at McKinley Park.

The surfacing and seeding of the slopes along Van Cleve Park has been nearly completed. Tile pipe extensions have been made to sewers at Webster Street and at Van Cleve Park. Work of extending the 6 ft. diameter concrete sewer at Herman Avenue is now under way. A concrete wall has been constructed in the yard of the Central Fire Station at Main Street. Good progress has been made on the construction of scow No. 5. The closure of Sunset Avenue dam has been accomplished since the last report.

The work of trimming slopes and cleaning up on the work above Island Park is nearly completed.

At Price Bros. plant, concrete blocks for the flexible revetment are now being turned out at the rate of about 1200 per day. The total output to date is about 20,000 blocks.

C. A. Bock, Division Engineer.

May 28, 1919.

RIVER AND WEATHER CONDITIONS

No serious floods occurred in the Miami Valley during the month of April. Although the rivers were swollen somewhat about the middle of the month, due to the rainfall of April 14 to 16, inclusive, dangerous stages were not reached in any of the streams. The rainfall at the District's stations varied from 3.33 inches to 4.60 inches. The total precipitation at the Dayton U. S. Weather Bureau Station was 3.57 inches, or .67 greater than normal.

At the Dayton U. S. Weather Bureau station the mean temperature for the month was 51.4° F., or 0.2 of a degree less than normal; there were 7 clear days, 8 partly cloudy days, and 15 days on which the precipitation exceeded .01 of an inch; the average wind velocity was 11.4 miles per hour, the prevailing direction being from the southwest; and the maximum wind velocity for five minutes was 36 miles per hour from the north on the 24th.

Ivan E. Houk, District Forecaster.

May 21, 1919.

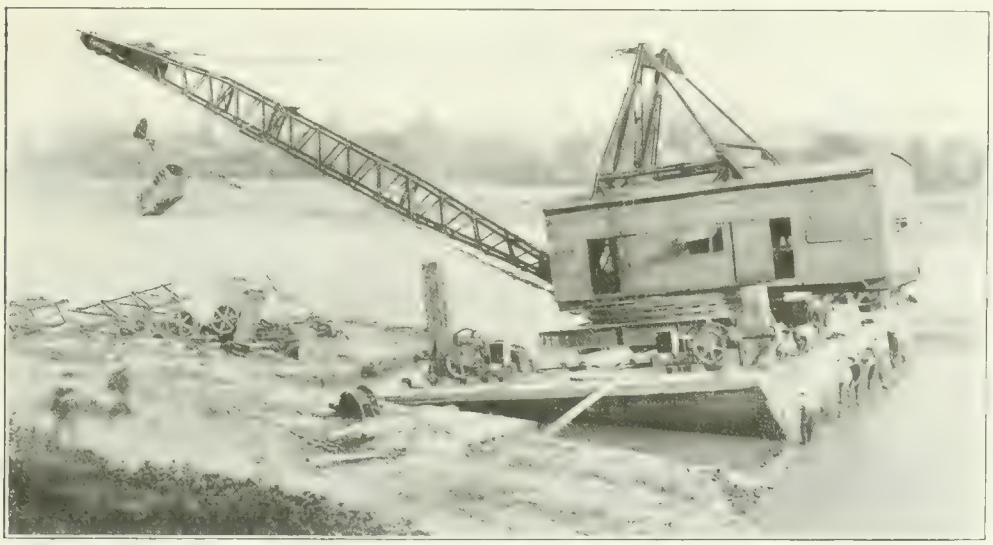


FIG. 151—DRAGLINE ON SCOW, DAYTON, MAY 14, 1919.

Dragline on Scow

The dragline as shown weighs about 200 tons. The vertical timbers in the foreground are the "spuds." There is a spud at each corner working up and down through the hull, driven by electric motors. Forced thus against the bottom of the river, they keep the scow steady while the dragline is excavating. The picture shows the scow, canted about six feet out of level (by thrusting down on the two right hand spuds), so that the men on the raft can recalk the joints between the side planking, the tilt being sufficient to raise the lowest joint out of the water. By canting first one way and then the other, both sides were thus recalked.

The scow, 40′80′x7′ in dimensions, has two 12″ and four 6″ longitudinal bulkheads extending the entire length of the scow and dividing it into five longitudinal compartments. These bulkheads are built up by 12″x12″ and 6″x12″ timbers respectively, forming built-up beams 80 feet long by 6 feet in depth. These bulkheads are braced longitudinally by 6″x6″ diagonals extending between the floor and deck cross timbers and bolted to the bulkheads. These bulkheads rest upon nine 12″x12″ floor timbers extending from side to side across the scow, with 18 6″x12″ intermediate floor timbers spaced between. A similar system of deck timbers is used. These floor and deck timbers are braced by double cross-diagonals 6″x6″ in size. The deck planking is 3″x8″ and the bottom planking 3″x12″. The four spuds are 24″x24″x20′. They are driven by Wagner alternating current induction motors of 3 phase, 60 cycle type, carrying current at 440 volts, developing 20 H. P. at 725 R. P. M. The drive to the spud rack is through three sets of gears and pinions.

The base frame of the Bucyrus Class 175 B dragline is about 25 feet square. This base rests on stiffening trusses run lengthways of the scow, the propelling trucks of the dragline being removed. The stiffening trusses are simple triangular (king) trusses, 12 in number, each formed of a 50-foot 12″x16″ southern pine timber laid lengthwise upon the deck of the scow, with a 2¼″ tension rod running from the timber ends to the bottom of the scow below the center of the timber, the center post of the truss being formed by timber crib work built between the floor and the deck timbers.

Departure of W. R. Yount

The Bulletin regrets to record the departure of W. R. Yount of the Railroad Relocation Division, who goes on June 1 into the employ of the Frank Hill Smith Co., Inc., to be one of their superintendents of construction. His work for the present will be in Dayton. Mr. Yount came with the Conservancy August 12, 1918, and has been assistant engineer on the Big Four and Erie construction work.

A small granite boulder about 7 inches long and 6 inches square, was recently caught in the circular intake chamber of one of the 500 H. P. dredge pumps at Englewood and ground off by the revolving runner in a groove 3 inches wide and an inch deep. What causes wonder to the uninitiated is to see a stone of such a size (it weighed 33 pounds) sucked up the nearly vertical intake pipe of a pump. Many stones somewhat smaller go through regularly

Six Months Progress of the Camp Community Associations

It is now nearly six months since the first Camp Community Association was organized at the Taylorsville dam site. Since that time the idea has had rapid development, and a report of what has been achieved is well worth presenting.

The fundamental idea was that the government of the camp community should not be imposed by those who had charge of the construction work at the dams, but should be democratic, initiated and carried out by the workers themselves the camp citizens. The story of its inception and early development at Taylorsville is given by O. N. Floyd, the division engineer in charge there, as follows:

"As soon as we began planning our construction camps, Mr. Morgan expressed a hope to see the people of the various camps work out for themselves some sort of camp government that would be responsible for all the activities of the community life and cooperate with those in responsible charge for the District in the matter of schools and other accommodations which must be provided by District funds.

"Following this suggestion of Mr. Morgan, as soon as our camp began to form, Mr. Daubenspeck took a very active interest in the subject, and got some books from the Dayton Public Library on governments for small towns and on the various forms of commission government. These forms of government were discussed frequently with the men on the job who were living in camp, or who expected to live in camp, so that before any definite action was taken [illegible] we had agreed that we wanted a commission form of government without a manager. Mr. W. D. Rogers (the superintendent of carpenters at Taylorsville) also took a very active interest in getting our organization started and the enthusiasm with which it was received in the beginning was due largely to his work among the men.

"On November 22, 1918, a preliminary meeting was held and committees were appointed to draw up a constitution and by-laws. Credit for the clear, short form of our constitution and by-laws is due largely to Mr. V. O. Aulabaugh, who was then our field clerk. The constitution and by-laws were accepted, with a few minor changes, on November 29, 1918, and officers were elected at the same meeting. It is not stated in our constitution that those in responsible charge for the District are not eligible for office in the Community Association, but this was understood and so stated at the time the constitution was adopted. We are convinced now that this was a very wise policy."

The Taylorsville constitution provides for government by five elected commissioners, in charge respectively of Community Service (camp improvements, gardens, transportation, religious and relief activities); Social Service (entertainments, sports, etc.); Education (including circulating library); Records and Finance; and Safety, (health, sanitation, fire, police, etc). There is no manager. The commissioner receiving most votes becomes chairman, a presiding officer only.

The association at Taylorsville was highly popular from the first, and launched into a number of activities, notably those of a social, religious and educational character. These will be noted in relation to some of the other camps where many of the same things were done.

The results have been marked. "The general spirit of our community has been excellent," says Mr. Floyd, "and very democratic. We are all very proud of our camp and every one is doing what he can to make it a pleasant place to live in, and for our visitors to look at and enjoy." One of the notable achievements was a banquet, with scores of guests, invited from all over the Conservancy District, and carried out with an enthusiasm which made Taylorsville the talk of every other camp and "boosted" the camp community idea (the vulnerability of the human stomach as an avenue to the will and intellect being well known), as perhaps nothing else could.

FIG. 152—RESIDENCE OF A. F. McCARTHY, TAYLORSVILLE, MAY 20, 1919.

Taken May 20, 1919. Horticulture is a religion with Mr. McCarthy. He worshipped one Sabbath day in this yard and garden (with rake, spade and wheelbarrow), from 5 a. m. until 9 p. m., with brief stops for meals. The rear door yard gets as careful attention as the front lawn,—"for the horticultural gods see everywhere."

For the idea had not caught at once in the other camps. It took time. In the end, however, it proved irresistable. Englewood, for instance, where it was the last to get started, has carried it, in some directions, farther than any other camp, and is developing it with great vigor and vitality. Englewood grafted onto the original scheme the idea of the city manager (at Englewood called the "Association Manager"), making the Commission a legislative body pure and simple. But the spirit is the same and the results have been striking, due in large part, perhaps, to the fortunate selection of the first manager elected, Mr. Arthur E. Kent. Much has been due also to the co-operation of Mr. McCurdy, the division enginer. Some of the results achieved, as reported by Mr. Kent, are given below.

"An old farmhouse in camp has been remodelled into a very attractive Community House. Club rooms are provided for the ladies upstairs and for the men on the lower floor. One end of the building constitutes a good sized hall for dances, entertainments and motion pictures. There is also a booth for a motion picture machine. In addition there is a small kitchen for use in preparing refreshments, etc. The Association has purchased a good player-piano for the hall and a pool table for the men's clubrooms. A travelling library has also been secured and placed in the Community House. The latter, besides affording a place for dances and public entertainments, provides a gathering place for people in camp desiring recreation and informal good times..

"Paramount-Artcraft pictures, the best on the market, are shown every Wednesday evening. Englewood was the first of the camps to secure this service. The Association has hired an operator and a Powers machine belonging to him which is installed in the booth. Most excellent service is thus obtained. The player-piano provides music in connection with the pictures. The pictures shown are equal to anything to be found at theaters in Dayton, showing such stars as Fairbanks, Hart, Marguerite Clark, Mary Pickford, Elsie Ferguson, etc.

"Among the most pleasurable features of the social life in camp are the dances. Regular dances are held at the hall on Saturday evenings on an average of twice a month. In addition a dancing class under the direction of Miss Elizabeth Jordan, is held every Monday evening. The class is well attended and very popular, particularly among the younger people in camp. A nominal fee is charged and the proceeds go to the piano fund.

"Englewood started the ball rolling in the baseball line by being the first to challenge the other camps of the District to a series of baseball games for the championship of the District.

"The school children have planted school gardens under the direction of Mrs. Everdell, camp school teacher. There are seventeen gardens in all, uniform as to size, and in the kind and amount of seed planted, etc. Accurate and careful records are to be kept of amount of produce from each garden and cost of time, labor, and materials put into each one. Prizes will be given to the children having the best gardens.

"A great deal of work has been done in camp toward making it more beautiful and attractive. The residents have responded to the movement in a most commendable way and have expended both money and labor in beautifying their cottages with shrubbery, vines, flowers and lawns. The only thing provided by the District to the residents of the camp cottages was grass seed. Everything else has been at their own expense and will not only do much to enhance the natural beauty of the camp, but will add to its value in dollars and cents. Several have gone out and cut sod where they could find it and made a sod lawn for themselves. There is much competition between residents of cottages as to who will have the most beautiful place. In March nearly two hundred young trees, elm, hard maple, basswood, oak, and ash were dug in the woods and transplanted in avenues along the streets in camp."

The Association at Huffman Camp was not started until January 21, nearly two months after Taylorsville organized, but here too, once started, the idea has proved very fruitful, and has developed in characteristic ways, as the following notes, contributed by Miss Mildred Goss, in charge of the Huffman school, and by Mr. C. C. Chambers, the Division Engineer in charge, will show.

"The Library and Reading Room (in the Community Hall which was fitted up by the Association) was opened on February 23. In addition to writing facilities, the room is equipped with about twenty different magazines and periodicals, and two daily and Sunday papers. A travelling library of fifty volumes has been secured through the State Travelling Library Department.

A piano has been purchased for the Community Hall.

A night school has been opened for the foreign laborers.

Fire apparatus has been placed in the village and a small house built as a fire station. All bunkhouses have been equipped with fire extinguishers. (These recently proved their worth in putting out a bunkhouse fire which without them would inevitably have burned the building to the ground.)

A Domestic Science room and a Manual Training room has been built in the Community Hall, and classes started in both subjects.

Flowering plants have been ordered from a Dayton florist, to be used in beautifying our yards.

A tennis court and a baseball ground are being laid out.

A park and playground is being fitted out, with swings, slides, and a wading pool for the children.

A community lawn mower has been purchased.

Probably the biggest thing the Association has done (which cannot be definitely expressed as an item of work), is the creation of a spirit of co-operation for the intellectual, social and physical improvement of the citizens in the camp."

The outstanding contribution to the Association idea evolved at the Germantown Camp has been the Germantown Club, an amusement organization within the Association proper, centering its activities in a clubroom. Similar clubrooms have been organized at the other camps, but nowhere else has this feature been so fully and successfully developed. A sketch of it is furnished through Mr. C. O. Shively, to whom especially its success has been due.

"This idea was an outgrowth of a desire on the part of the commissioners of the Association to furnish amusement and entertainment to the employees at Germantown Dam during their idle hours, and also to serve as a means of financing the Associa-

tion. Consequently a vacant bunkhouse was selected and the interior suitably remodeled for a club room.

"The club room was furnished with the idea of giving the greatest variety of entertainment possible. A portion of the room was set aside for a pool table; a portion for a reading and game room and still another portion was set aside for the refreshment counter where ice cream, soft drinks, cigars, candy, tobacco, etc., are sold.

"The problem of managing the club house was solved by employing a club house manager, who gives his entire time to the task. It is the duty of the manager to handle all sales, maintain orderly conduct, and keep the club room in good condition. Supplies for the refreshment counter are purchased by the purchasing agent of the Association.

"When the Association was formed its membership was solicited and $275 was raised. On this small amount a pool table and supplies were purpurchased. This drained the treasury nearly dry. However, the sales began to grow rapidly from the very start and all anxiety on the financial score was dissipated. The pool table alone (at 2½ cents per cue) averaged $3.00 per day, which is enough to meet all overhead expenses. In the first seven weeks the club house cleared about $100 over and above all expenses. The average daily sales amount to about fifteen dollars. The monthly profits will average between fifty and sixty dollars. This, however, we expect will increase as the weather becomes warmer. Many visitors add materially to the sale of ice cream and soft drinks on Sundays. We feel that financially the club has proven a success, which will enable the Association to accomplish many things on a large scale, such as a Fourth of July celebration, Christmas entertainment for the children, etc., which would otherwise have been impossible.

"To what extent has the club benefited the employees and the community at large? It has reached the foreigner as well as the laborer. Not only do all classes of laborers congregate at the club in the evenings to play pool, read or enjoy one another's company, but also the foremen and the engineers meet and mingle with those present.

"The club house had eliminated the "nothing-to-no-place-to-go" spirit which had invaded every bunk house in the camp prior to the opening of the club. It has proven itself worth while."

Toward the financial expenditures made by these Associations it needs to be said that the Conservancy District contributes no money whatever. It does contribute the use of the Community Hall at each camp, with the necessary light and heat, considering that the gain to the District in the morale of its workers, which is unmistakable, more than repays this expense. The cost of all the activities of the associations, excepting the item mentioned, is borne by the voluntary contributions of the camp citizens.

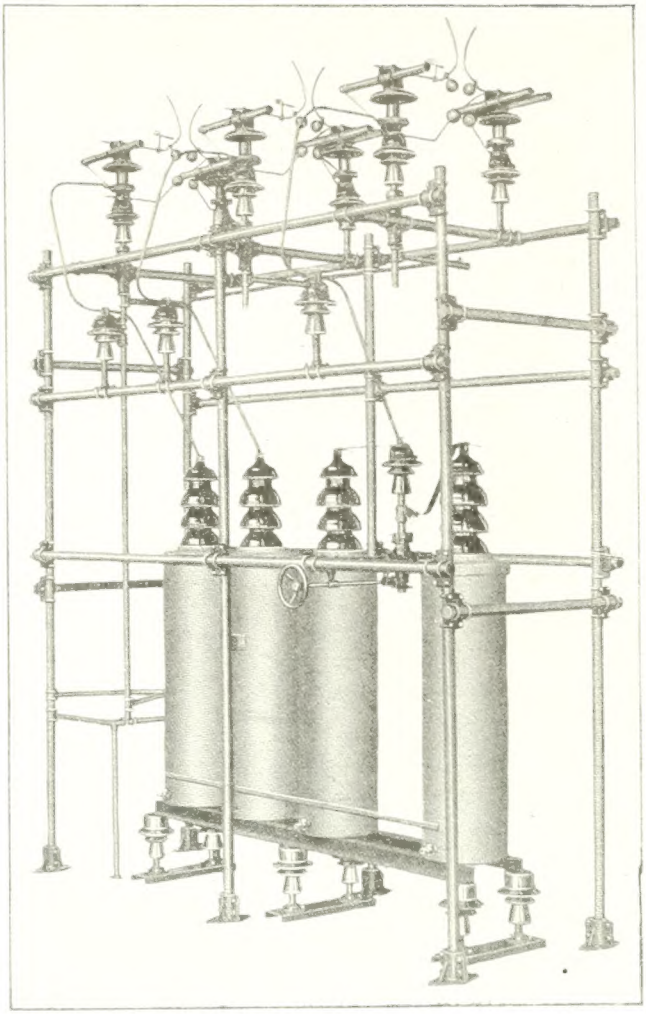


FIG. 153—LIGHTNING ARRESTER, ENGLEWOOD

The view is incomplete, not showing the "choke coils," nor the "ground plate" which is buried in the earth below. One of the three choke coils can be seen in Figure 146. It is the highest piece of apparatus at the near end of the higher iron frame work in that figure. For explanation of Lightning Arrester see below.

The Alternating Current Lightning Arrester at Englewood

The discharge is so directed that instead of passing through the expensive apparatus of the substation, it is led harmlessly, along a by-path provided, into the earth. The essential parts, in order, beginning at the top (Fig. 154), are the "choke coil" (AB), the "spark gap" (CD), the aluminum cell (E), and the ground plate (F) buried in the earth. The copper wire connections are shown by broken lines. Supposing the line working as usual. The current comes from the line at A and passes through the choke coil to B and on to the transformer at the substation. It cannot get from C to D because to do so it would have to jump across an air gap, either from one sphere to another or across the "horns" at H.

When a discharge from lightning comes in over the transmission line, however, the action is quite changed. The choke coil, which is simply a coil of heavy copper wire shaped like an old-fashioned bed spring, has the peculiar property that it resists the tremendously sudden rush of the lightning discharge, just as a very heavy door resists an attempt to suddenly open it. Checked at the choke coil, the discharge jumps one or other of the gaps provided between C and D and on through the aluminum cell E to the ground at F, where it dissipates harmlessly. The gap between C and D, once bridged by the lightning discharge, the regular line current is able to follow. The aluminum cell however, has the property of resisting very

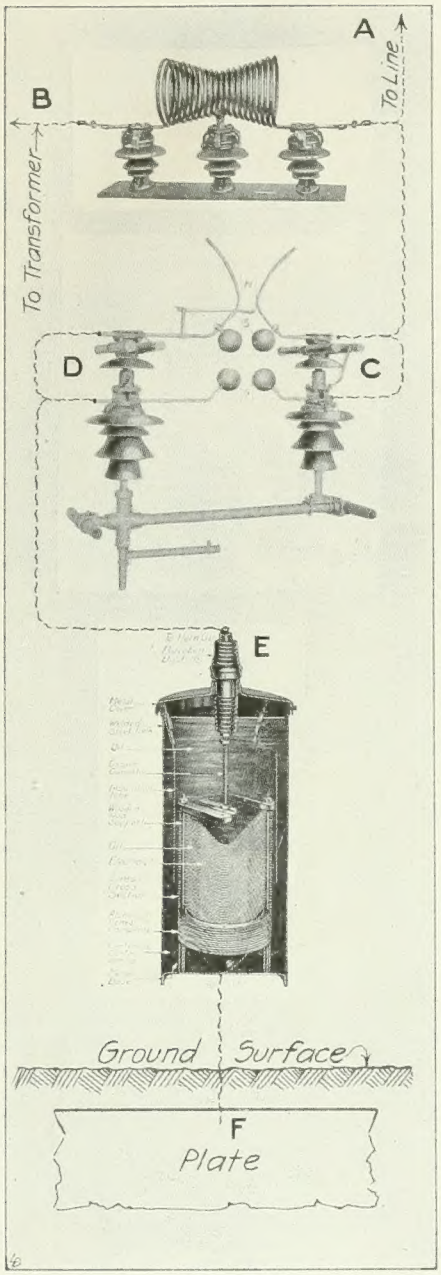


FIG. 154--LIGHTNING ARRESTER PARTS

strongly the line current, (while permitting the lightning discharge to pass readily). Meanwhile the white hot "arc" of heated air which carries the current across the gap from C to D creates a violent uprush of air, (precisely as at a fire), which blows it up the diverging horns at H, until it is finally blown out at the top, (as a candle is blown out). This breaks the path to earth entirely and the line current resumes its old course through the choke coil to the transformer at the substation.

The entire apparatus is shown in Fig. 153, except the three "choke coils," for which see Fig. 146 and caption thereto. Fig. 153 and the parts of Fig. 154 are reproduced by courtesy of the General Electric Company's office in Dayton.

A Word About Our Technical Reports

That the work of the Conservancy District is beginning to attract wide attention is well known, and is indicated by the many requests for information concerning it, and by the ever increasing number of visitors to the sites of the work.

It is not so well known, however, that this interest has gradually spread to quite remote parts. To be told that the University of Saskatchewan possesses the complete series of our Technical Reports down to the very latest number; that the universities at Melbourne in Australia, Pei Yang in China, and St. Martial College on the Island of Haiti have these reports on their shelves, is to say the least, startling. Such is the case, neverthless, and many other distant localities could be cited, but the list is too long.

Since the cessation of the war, renewed interest in the work being done by the Miami Conservancy District has manifested itself from every civilized corner of the globe except Europe. Many orders for Technical Reports have been received since the first of the year. Frequent letters express gratification at the excellent presentation of the matter in the reports, and its value to the engineering profession and to the public generally.

The list of subscribers contains not only professional engineers, but many institutions of learning who find in these reports valuable material for instruction; also many concerns who find in them matters of direct interest in connection with undertakings of their own, which though unlike the Miami Conservancy work, frequently possess points in common with it.

Over one thousand individuals, corporations, and institutions have thus far purchased Technical Reports, most often in the form of complete sets. Among them are found the names of more than 150 well-known consulting engineers, 41 city engineers and county surveyors, 69 colleges and universities, and 27 public libraries. The latter number represents probably less than half the libraries which have actually obtained Technical Reports, as the libraries of colleges, universities, government and state institutions are not included in this number.

Institutions of public and semi-public character number 72. Conspicuous among them are the United States Government offices in the War, Navy, Interior, and Agricultural departments, state institutions, such as departments of health, conservation commissions, reclamation departments, flood control districts, highway departments, and railroad commissions. One bureau of the U. S. War Department purchased 75 sets. The U. S. Office of Public Roads and Rural Engineering bought 30 copies of the Report on Great Storms. Eighteen prominent railroad companies through their chief engineers or presidents appear on the lists; also 19 water power companies.

Particularly gratifying is the ever increasing interest in the work of the District shown by residents of foreign countries. Chief among these are naturally our Canadian neighbors, who live in a country abounding with hydraulic problems. From them more than 60 orders for reports have been received. Other countries represented are: British India, Japan and China with 7 each; Australia, Cuba, Hawaii and the Philippines with 5 each; Great Britain with 3; Chili, Haiti, and Tasmania with 2 each; and single subscribers in Argentine, Brazil, Guatemala, Italy, New Zealand, Norway, Nova Scotia, Panama, Peru, Porto Rico, Rhodesia (South Africa), and Sweden. In British India the chief engineers of public works departments or the secretaries to the government of 14 provinces possess the technical reports. This list includes 8 foreign universities and colleges. To the figures quoted for China and Japan might be added a number of orders received from Chinese and Japanese students taking technical courses at American universities.

It will be noted that the European countries are conspicuous by their absence or poor representation. The war period and the unsettled conditions resulting from it are mainly to blame for this. We hope that after lasting peace has been restored there the interest in civil and scientific pursuits, including the work of the Conservancy District, will be revived.

Gerard H. Matthes.

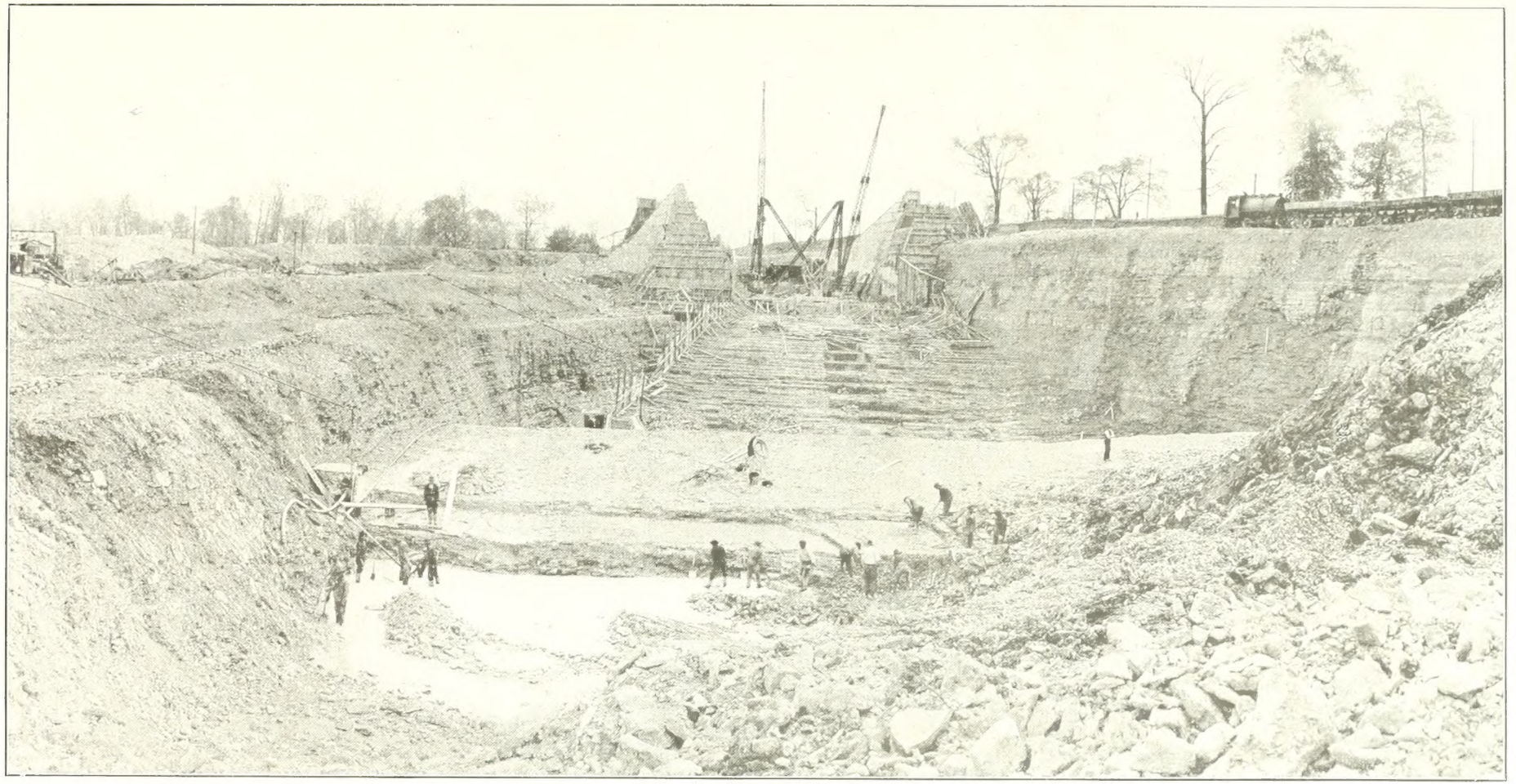


FIG. 155—HUFFMAN OUTLET EXCAVATION, AND CONDUIT AND SPILLWAY STRUCTURE WALLS, MAY 15, 1919.

The picture is taken from a point beside the dragline excavator seen in the center of the double page picture, Figure 146. The structure is being built in the old bed of Mad River, which has been diverted and now flows several hundred feet to the left outside the picture. The river will be turned back again and come down between the walls as seen. The space between the walls will be blocked by a cross wall, which also supports the "spillway" crest or "weir" to carry excess water in times of heavy flood. Three concrete conduits built side by side will pierce the cross wall at the bottom and take the ordinary river flow. The general plan is the same as that at Lockington, described in a previous Bulletin.

The dam, of earth, will be built to the right and left of the walls as seen, across the valley, the top of the dam being about 20 feet above the highest point of the walls, as shown in the picture. The slope of the walls follows what will be the slope of the earthen part of the dam. The left hand wall has a base thickness of 45 feet, narrowing to a thickness of three feet at the top. It is founded on solid rock. The right hand wall, 12 feet in thickness at the base, is built on rock bottom and against the solid rock wall at the right. From the top of this rock wall it rises uniformly with the left hand wall to the same top thickness. Between the walls the concrete floor is 5 feet thick on rock foundation. The distance between the walls widens as they come downstream, following the descending rock stairway which appears.

The concrete was mixed at the gravel washing plant seen just behind the left hand wall in the distance and brought to the work in 1¼-yard dump bottom buckets, carried on small platform cars pushed by a gasoline locomotive. The buckets are lifted and dumped in the forms by the double electric derrick seen in the center of the picture. The booms are 100 feet in length and are used also to move the concrete forms.

All the rock in this excavation seen in this picture and in Fig. 146 was drilled and blasted and then removed by the dragline excavator seen in Fig. 146. This machine did remarkable work. At one setting it removed 25,000 cubic yards of rock. It excavated the bottom of the pool in Fig. 146 from approximately the same level as that on which it stands in the picture, a vertical distance of 60 feet. It is a Class 24 Bucyrus electric dragline with 85-foot boom.